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(54) **Mounting assembly for a vehicle interior rear view mirror**

(57) A two-piece mounting assembly for a vehicle interior rear view mirror comprises a rigid base part (not shown in Fig. 1) such as die cast metal having a linear coefficient of thermal expansion close to that of glass and adapted for gluing directly onto the inside surface of a vehicle windscreen, and a mirror case support bracket 1 formed as a single integral member of plastics material. The bracket 1 comprises a mirror support arm 11 having at one end a clip 12 for secure but blow-releasable engagement with the base part and having at the other end a spherical ball 13 for universal mounting of a mirror case. The clip 12 is also adapted for sliding engagement and disengagement with the base part, so that the bracket 1 can be readily removed other than by way of blow-releasability. If desired an integral steadying element 20 can be provided which bears resiliently against the windscreen in use.

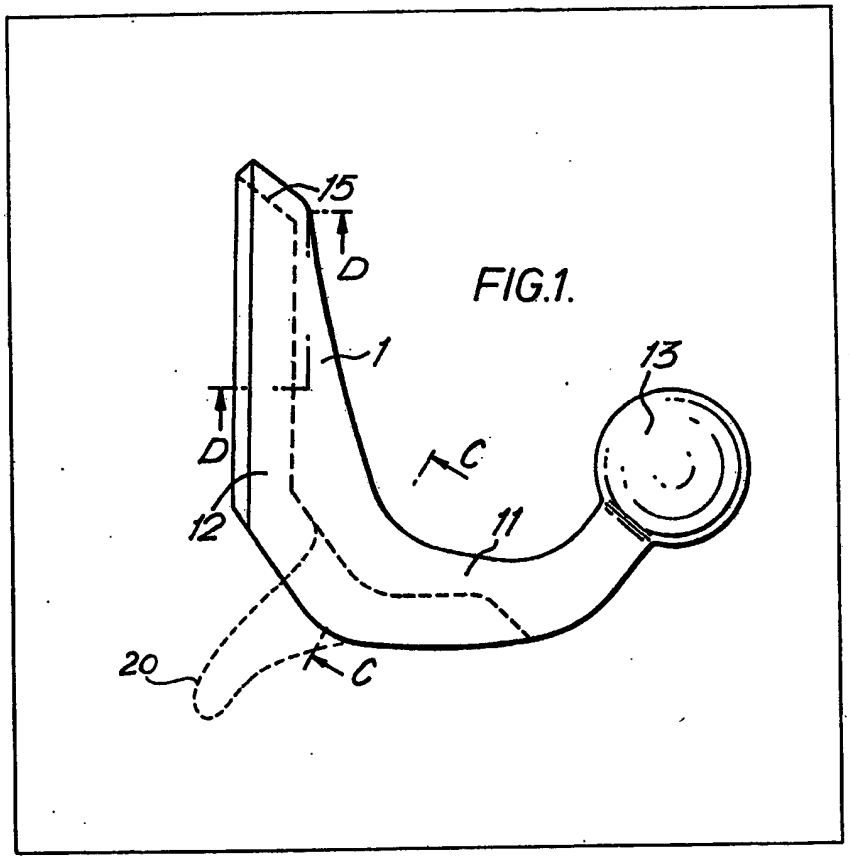

FIG.1.

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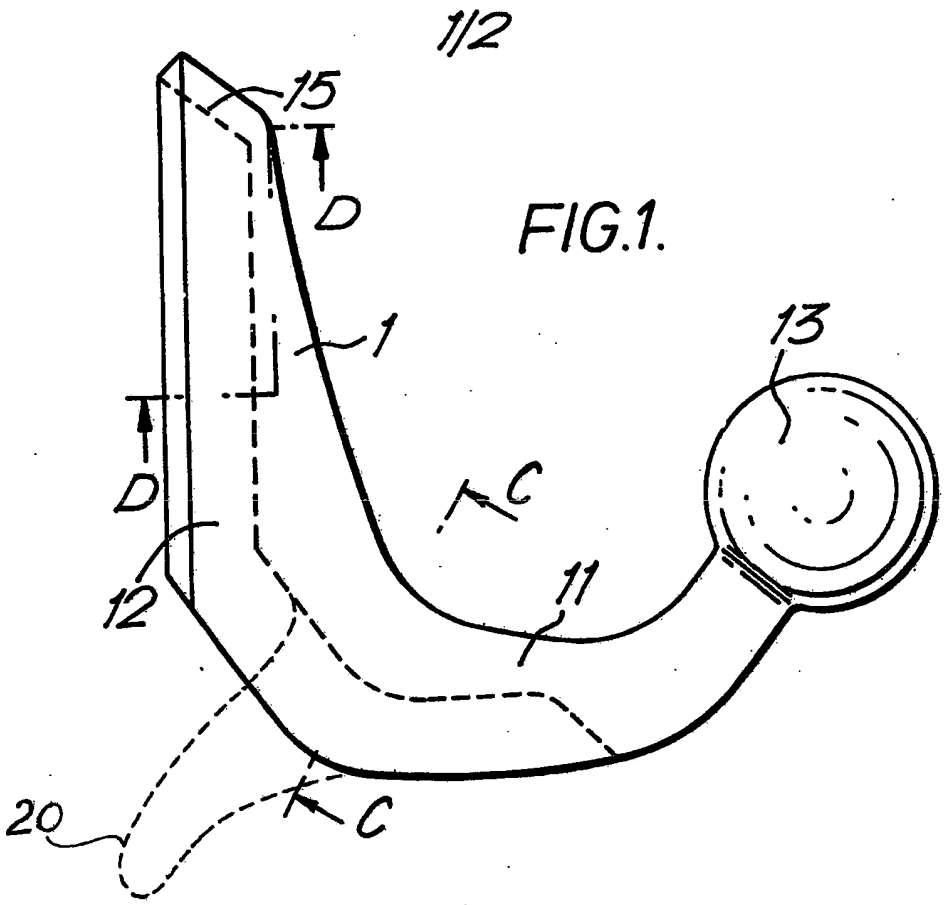


FIG.1.

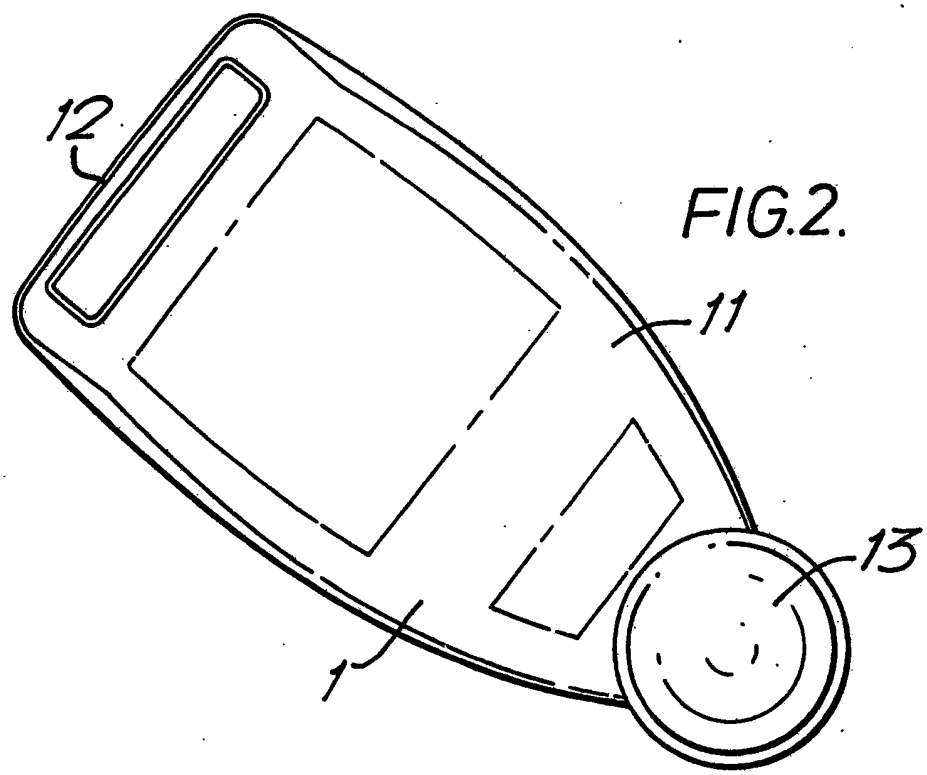


FIG.2.

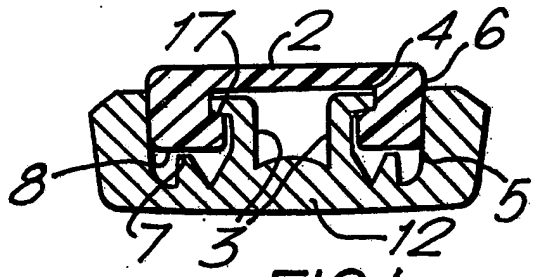
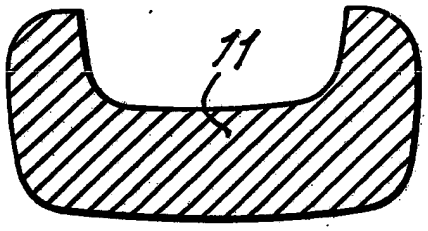


FIG.4. D-D

FIG.3. C-C



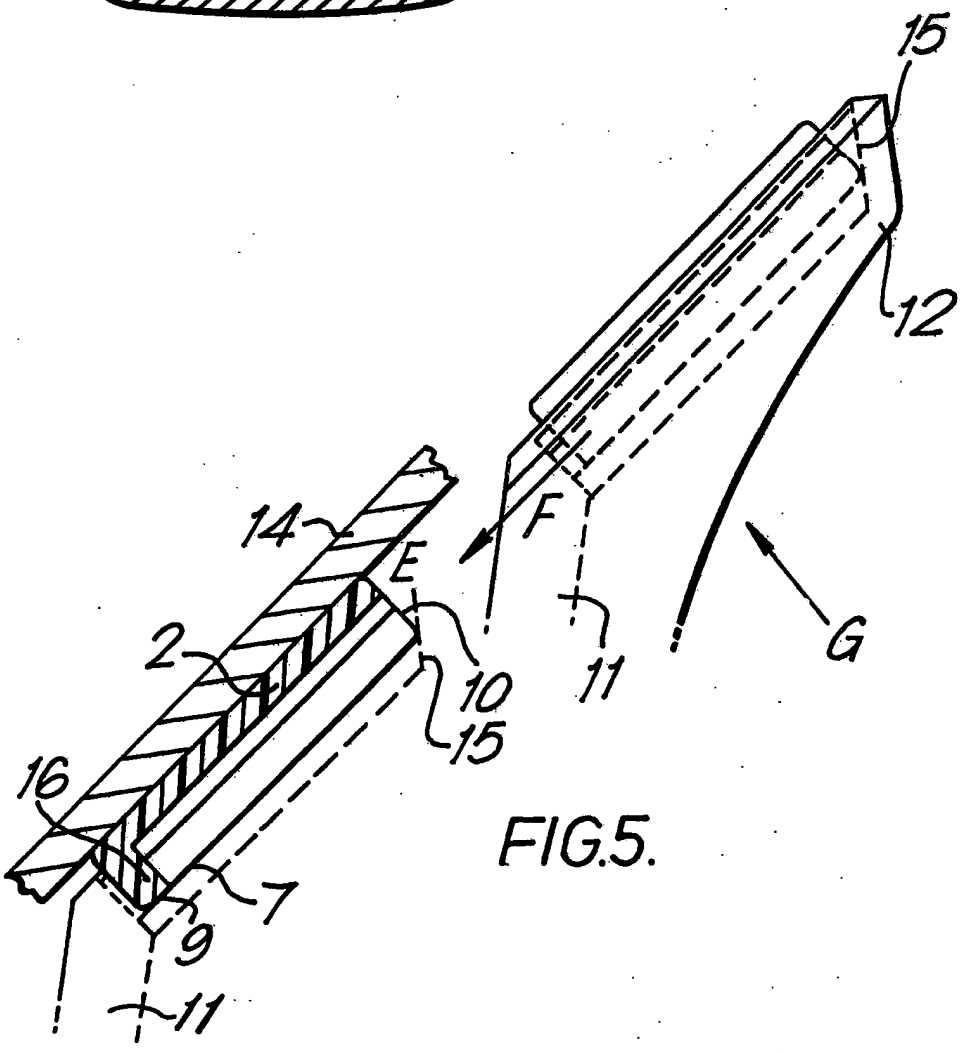


FIG.5.

SPECIFICATION

Mounting assembly for a vehicle interior rear view mirror

The present invention relates to a mounting assembly for a vehicle interior rear view mirror, the assembly comprising a mirror case support arm and a base part adapted to be glued directly to a vehicle front windscreen, the support arm being adapted to be firmly connected to the base part in normal use but the connection being blow-releasable in the event of impact at the mirror case due to sudden voluntary deceleration of the vehicle or an accident.

Prior windscreen-mounted interior rear view mirror mounting assemblies with a blow releasable feature, such as those described in French Patent Nos. 2,132,920, 2,210,958 and 2,229,233, comprise a mirror case support arm of a rigid material (usually die cast metal), a base part for attachment to the vehicle windscreen, and a separate resilient clip which secures the support arm to the base part. In these assemblies the clip part is composed of a plastics material for pliability. The support arm is firmly secured to the base part through the plastic clip but some of the engaging surfaces of the clip are flexible compared to mating surfaces of the base part so that the clip and support arm can become disengaged upon impact at the mirror case. Thus these assemblies comprise at least three parts — the support arm, the base part, and the clip.

Two-part mounting assemblies are also found in prior art of blow releasable vehicle interior rear view mirrors, wherein the support arm and clip are formed as one piece referred to hereinafter as a support bracket; see for example U.K. Patents 1,199,108 and 1,224,875. However, these brackets are composed of some unspecified, but by implication rigid, material since the base part to which the support bracket is attached is specified as of the resilient plastics material, the mechanism for release of the support bracket after a blow depending on the pliability of certain surfaces on the base part which engage with comparatively rigid surfaces on the support bracket.

It may be noted that one cannot achieve satisfactory overall performance from a blow releasable one piece bracket mounted on the windscreen if the bracket is composed of a rigid material such as die cast metal. In that case the base part must be composed of resilient material such as plastics in order that the support bracket may be releasable upon impact and it is well known that the thermal expansion properties of plastics are far from corresponding to that of glass. For this reason the resilient base parts in these prior two-part assemblies are usually designed and shown to be attached to a vehicl roof header or other body structure and not to the vehicle windscreen.

In other cases, mentioned already, in which the rigid base part is attached directly to the vehicle windscreen, the support bracket is always composed of the two parts, a rigid support arm and a resilient clip part, so that the complete mounting assembly comprises three parts.

It is thus an object of the present invention to provide a mounting assembly for a vehicle interior rear view mirror which is suitable for attachment to a windscreen and which comprises only two essential parts.

Accordingly, the present invention provides a two-piece mounting assembly for a vehicle interior rear view mirror, the assembly comprising a rigid base part having a linear coefficient of thermal expansion close to that of glass and adapted for gluing directly onto the inside surface of a vehicle windscreen, and a mirror case support bracket formed as a single integral member of plastics material, the bracket comprising a mirror support arm having a clip at one end with resilient elements for secure but blow-releasable engagement with the base part and means at the other end for universal mounting of a mirror case, the bracket further being readily mountable and demountable on the base part other than by way of the blow-releasability.

There are several features of a blow releasable plastics one-piece support bracket which make its use advantageous compared to an assembly of separate support arm and clip as well as, in some cases, a cover part or parts.

The cost of producing a one piece plastics bracket will be less than that of a two piece assembly comprising, for example, a metal die cast support arm and a plastics clip piece.

The plastics one piece bracket may readily be formed of such a material and in such a shape as to make it aesthetically attractive, including provision for an identifying logo if required, without need for further surface finish or covering parts whereas a metal die cast support arm, for instance, will require to be given a superior surface finish such as high quality painting both to protect it from environmental discolouration and corrosion and to provide a measure of attractive toning with the clip part and other interior surfaces.

Furthermore, in many cases it is required by automobile manufacturers that the usual metal support arm and plastics clip assembly be provided with plastics covering pieces which are assembled with smooth mating surfaces to provide an aesthetically pleasing assembly. Such separate cover parts are not required with a one piece plastics bracket.

An advantage of a one piece plastics bracket concomitant with the reduced cost of production lies in that the number of parts, generally from different sources and production processes including finishing processes is reduced from three or more to only one in each case, thus relieving the dependency on the reliability of several individual processes or subcontract sources.

By the same token further cost reductions will ensue from reduced inventory levels and control procedures as well as quality checking and delivery monitoring procedures and costs. The shape and styling of a one piece bracket and the moulding method is such that it is no more

difficult to achieve high quality and yield of acceptable parts than with any of th separate parts required for the assembled support brackets of the prior art.

In addition, there is at least one less assembly operation for the plastics one piece bracket before delivery to the vehicle for mounting on the windscreen and two or three less assemblies in the case of covered bracket assemblies.

Again, since a one piece bracket does not have to be provided with an indexing, engaging fixture or clip between the separate support arm and the base part, as is the usual case with present multipart designs, there is greater freedom for the most economic and functional design of the clip and base part attachment mechanism on a one piece bracket.

A further advantageous result of this feature is that a one piece plastic bracket is likely to sustain less vibrations at the mirror case since there is only one junction between the support bracket and the base part, which may be optimally designed for secure but blow-releasable attachment whereas in the usual multipiece assembly vibrations can originate at the attachment between the separate support arm and the base clip parts. The space available for the appropriate shaping of the support arm at the inter-connectable engagement of the three parts in these designs is usually limited by aesthetic consideration so that the provision of secure, vibration free attachment of the separate support arm is problematic.

An embodiment of the invention will now be described, by way of example, by reference to the accompanying drawings, in which:—

Figure 1 is a side elevation of a plastics one piece support bracket;

Figure 2 is a front view of the one piece bracket of Fig. 1,

Figure 3 is a section through the bracket at C—C of Fig. 3,

Figure 4 is a section through the clip end of the bracket at D—D of Fig. 1 and a section through the corresponding point of a base part upon which the bracket is mounted, the connection between the bracket and base part being illustrated; and

Figure 5 shows the manner of engaging the bracket with the base part.

Referring to the drawings, the mounting assembly comprises a one piece plastics support bracket 1 and a rigid substantially inflexible base part 2. The bracket 1 comprises a support arm 11 and a clip 12 integral therewith. The bracket 1 is moulded from plastics material such as Acetal or Noryl (Registered Trade Mark) or other relatively rigid plastics material and is integrally formed with a 16 mm diamet r spherical ball 13 at one end f th arm 11 for ins rtion in a complementary s cket in a mirror holding case (not shown) according to a conventional technique f r universally adjustable support of a mirror case. The integral clip 12 at the other end of the arm 11 is formed as a sliding clip connector with r silient engag m nt members (to be described) by which the bracket 1 is attached to the rigid base part 2.

The base part 2, which is typically composed of stamped or die cast metal in use s cur ly bonded directly to th inside surface of a vehicle windscreen 14 (fig. 5) by use of a suitable adhesive such as a polyacrylate, and the one-piece bracket 1 may be released from connection with its base part 2, by means to be described in detail below, when the bracket 1 receives an impact via the mirror case.

It should be noted that the base part 2 is composed of a material whose linear coefficient of thermal expansion is close to that of glass so that under repeated heating and cooling cycles of the vehicle windscreen 14 the base part 2 will not expand or contract much differently to the windscreen area to which it is glued Such differential expansion and contraction would eventually weaken the adhesive bond between the windscreen and base part or restrict the choice of bonding adhesives to types with less suitable bonding characteristics. It is inherently easier to secure a reliable bond between parts which do not greatly expand or contract differentially. The coefficients of expansion of several suitable metals including steel and also die cast parts such as "zamack" (Registered Trade Mark) are close in value to that of glass. The base part 2 material should thus be selected to have as suitable thermal expansion properties as possible while being inherently rigid and immune to environmental distortion so that the resilient engagement members of the clip 12 of the one piece bracket 1 will be disengaged from the base part upon the mirror case receiving an impact as already indicated.

The support arm 11 forming the greater part of the bracket 1 is of such cross section (for example of U-cross section as shown in Fig. 3) that it is sufficiently rigid for the purpose of supporting the mirror and under normal conditions is substantially free from any tendency towards flexible vibrations of the bracket component itself, but the clip formation 12 at the end of the bracket 1 should contain sufficiently resilient members which engage with and form the attachment to the rigid base part 2.

It is an important feature of the present assembly that the bracket 1 is readily removable and replaceable on the base part 2, other than by way of blow-releasability. Thus the base part 2 is open at the end E (Fig. 5) and the clip 12 is open at end F. To mount the bracket 1 on the base part 2, the resilient longitudinal tongues 3 (Fig. 4) of the clip 12 of the bracket 1 are engaged and slid into the complementary grooves 4 of the base part 2 To secure the engagement and keep it substantially vibration-free the resilient tongues 3 are bent slightly towards the axial centr line of the brack t 1 by th ngaging groov s 4 of the base part 2, and th side walls 5 of the bracket 1 may als bend slightly outwards by th contacting side walls 6 of the rigid base part 2.

While the bracket 1 is being slid into engagem nt with the base part 2 the bearing

surfaces 7 of th bracket 1 ar pressed slightly against the complementary bearing surfaces 8 of the bas part 2. This also helps to s cure the attachment of the bracket clip 12 in th base part 2.

When the base part 2 is fully engaged in the bracket 1, a stop surface 15 (Fig. 5) on the bracket meets the base surface 10 and the bearing surfaces 7 protrude beyond the opposite end wall 16 of the base part 2. It will be observed in Fig. 4 that the side walls 5 of the bracket 1 embrace the base part on the opposite sides 6 thereof parallel to the direction of sliding engagement, so that the base part 2 is substantially hidden from view from within the vehicle. The bracket 1 may be readily removed from the base part 2 by the reverse of the above procedure, i.e. sliding in the opposite direction.

However, should the bracket 1, when attached to the base part 2, receive a blow through the mirror case in the direction G shown in Figure 5, the bearing surfaces 7 obtain a leverage about a fulcrum point on the surface 9 of the end 16 of the rigid base part 2, and the bracket 1 is released from the part 2 by disengagement of the pliable tongues 3 from the grooves 4.

The underside surfaces 17 of the tongues 3 are slightly slanted, as are the complementary surfaces of the grooves 4, in an outward direction to further facilitate the rapid release of the bracket 1 after impact. The bracket 1 when blow-released in this manner, may be remounted on the base part 2 by sliding engagement as described above.

While the above assembly provides adequate vibrational stability under normal conditions, it is possible to increase the vibrational stability of the bracket 1, by incorporating an integral steadying member projecting from the rear of the bracket 1 and adapted in use to abut against the inside surface of the windscreen. Such a steadying member is shown in broken outline at 20 in Figure 1. The steadying member 20 is sufficiently resilient that it can be held back from the windscreen when fitting the clip 12 to the base part 2, but when released it will abut against the windscreen with slight resilient deformation so as to provide additional steadying of the bracket 1.

To summarise, therefore, the above mounting assembly provides the following advantages:

a) The rigid base allows good adhesion to the windscreen with the base stuck to the screen having a thermal expansion coefficient close enough to that of glass so that no problems result due to this bond between glass and base (e.g. bond is unlikely to break when subjected to extremes of temperature).

b) The single plastics (non rigid) component which incorporates the brack t support arm and clip provides in one easily arranged and cost eff ctive manufacturing process the features f:—

(i) Mirr r Support

(ii) Mirror adjustment torqu ball/socket joint at the ball end of the bracket.

(iii) Ease of removeability and replac ability of mirrors (when this is required) without requirement to reestablish adhesive bond which is often a practical difficulty.

(iv) Control of effort needed to remove the mirror from the base under conditions of impact i.e. control of blow-releasability.

c) The fact that the above features are embodied in the single plastics component also results in the assembly being less prone to vibration due to fewer parts in the bracket assembly.

d) It would be easy to change the part design so that an added vibration steadying element could be embodied into the non-rigid component without additional components and assembly operations being required.

CLAIMS

1. A two-piece mounting assembly for a vehicle interior rear view mirror, the assembly comprising a rigid base part having a linear coefficient of thermal expansion close to that of glass and adapted for gluing directly onto the inside surface of a vehicle windscreen, and a mirror case support bracket formed as a single integral member of plastics material, the bracket comprising a mirror support arm having a clip at one end with resilient elements for secure but blow-releasable engagement with the base part and means at the other end for universal mounting of a mirror case, the bracket further being readily mountable and demountable on the base part other than by way of the blow-releasability.

2. An assembly as claimed in Claim 1, wherein the ready mounting and demounting of the bracket on the base part is achieved by sliding engagement or disengagement respectively of the resilient elements of the clip with complementary elements of the base part, and wherein the blow-releasability is achieved by forcible disengagement of the complementary engaging elements in a direction other than the direction of sliding.

3. An assembly as claimed in Claim 2, wherein the clip and base part comprise respective bearing surfaces which abut one another during the sliding engagement, and wherein in the fully engaged position of the clip on the base part the bearing surfaces of the clip extend beyond an end wall of the base part, the end wall constituting a fulcrum point for leverage of the clip bearing surfaces during blow-release.

4. An assembly as claimed in Claim 2 or 3, wherein the secure engagement of the clip with the base part is achieved at least in part by a slight resilient deformation of the resilient elements of the clip by the complementary elements of the base part.

5. An assembly as claimed in Claim 2, 3 or 4, wherein the clip embraces the bas part on opposite sid s thereof parallel to the dir ction of sliding engagement so that the base part is substantially hidden from vi w fr m within the v hicle.

6. An assembly as claimed in any preceding

claim, wherein the bracket further comprises a steadying member extending integrally from the support arm and adapted in use to bear resiliently against the inside of the windscreen.

7. An assembly as claimed in any preceding claim, wherein the universal mounting means comprises a spherical ball.

8. An assembly as claimed in any preceding claim, wherein the support arm is of U-cross section.

9. A mirror case support bracket for use as one component of a two-piece mounting assembly as claimed in any preceding claim.

10. A two-piece mounting assembly for a vehicle interior rear view mirror, substantially as described with reference to the accompanying drawings.

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